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Bibliometric Analysis of Research Publications of Al-Jouf University, Saudi Arabia during the Year 2006-2017

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ABSTRACT

The study investigates the research contributions of Al-Jouf University, Saudi Arabia in terms of its publication output during 2006-2017 as reflected through Scopus database. The study, using Microsoft Excel, analyses the year-wise research productivity, its citation impact, national and international collaborations, top collaborating institutions, subject-wise distribution of papers, journals used for communication, most preferred journals for publication, most prolific authors, number of citations received, and top cited papers of the University during the period under study. The paper concluded that Al-Jouf University is growing and improving in terms of research publication output.

Keywords: Research Productivity, Bibliometrics, Higher Education Institutions, A-Jouf University, Saudi Arabia

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1. INTRODUCTION

Research is a structured inquiry that utilizes acceptable scientific methodology to solve problems and create new knowledge [1]. It is an investigation of finding solutions to scientific and social problems through objective and systematic analysis. Slesinger and Stephenson [2] in the Encyclopedia of Social Sciences define research as “the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in the construction of theory or in the practice of an art”. It is a process of collecting, analyzing and interpreting information to answer questions. The growth in information and communication technologies (ICTs) in general and electronic information resources in particular, have given momentum to research and related activities throughout the world.

Advances in knowledge take place through research publications in the form of journal articles, conference proceedings, and communications among others. The research activities of an institution are reflected through its publications. Publications and citation data are two indicators that are used to assess the quantity and quality of scientific activity of a country, institution and an individual. While analysis of publication data gives a picture of total volume of research output, they provide no indication as to the quality of the work performed. Although citation data have some limitations for evaluation, it is generally believed that a paper cited is utilized more by researchers and so is considered more relevant to their work. Furthermore, bibliometric analysis can be used to determine emerging research areas, to analyze the research performance of individual scientists, research groups, institutions and countries, to outline the cognitive or intellectual structure of a research area and to examine the relations between authors, institutions and journal articles. There have been many bibliometric and scientometric studies to assess the research productivity of various disciplines as well as institutions of the developed world. However, very little attention has been paid to the academic output of scientifically middle-level countries and the production of their institutions [3, 4].

Kingdom of Saudi Arabia (KSA) is the largest country in the Arabian Peninsula and plays a leading role in research activities in various disciplines in all Arab states. Higher education in the Kingdom has expanded rapidly in recent decades, out of 64 universities, 24 belong to the public sector [5, 6]. The Kingdom's research publication output is on the rise [7]. The Saudi government has been emphasizing and fostering the importance of scientific research through the implementation of research centers in government hospitals and universities, with the intent to improve the quality of research in the country while maintaining a constant production of research publications. Since the 1980s, there have been some bibliometric studies to showcase the research output of Saudi Arabia at national level [7-10] but very few attempts have been made to analyse the research contribution of a particular institution [11-14].

1.1 Al - Jouf University, Al-Jouf, Saudi Arabia

Founded in 2005 by the Royal Decree No. (6616), Al Jouf University is a non-profit public higher education institution located in the Al-Jawf region of northern Saudi Arabia [15]. It serves four major cities in the region of Al-Jawf namely, Sakaka, Domat Al-Jandal, Tabarjal and Gurayat. Accredited and/or recognized by the Ministry of Education, KSA, Al Jouf University (JU) is a large Co-educational higher education institution that offers courses and programs in various disciplines including, engineering, law, humanities, sciences, management and health sciences through its 16 colleges and 87 departments. It has a current enrollment of more than 30,000 male and female students and a strength of more than 13,00 faculty to teach them [16, 17].

2. OBJECTIVES

The main objectives of this study are to:

- (a) Analyse the year-wise research productivity and growth of JU publications

- (b) Examine the national and international collaborations of JU for research publications
- (c) Examine the distribution of research output under different subject categories
- (d) Analyse the most common journals used for communication
- (e) Identify the most prolific authors of the University
- (f) Study the citations received by the papers and to identify the highly cited papers

3. DATA SOURCE AND METHODOLOGY

The study is based on the publications data retrieved from Scopus database for the period 2006- 2017. The string which was used to retrieve the relevant data on research productivity of Al-Jouf University was: (AF-ID ("Al Jouf University" 60104126)) AND PUBYEAR >2006 AND PUBYEAR <2017). Only the journal articles, reviews and articles in press were considered for the study. The results obtained were refined in order to get relevant data regarding authors, institutions, source journals, etc. For calculating the international collaborative papers the affiliation field of each article was manually checked. For citation data, the citations received by the article since its publication were considered.

4. ANALYSIS

4.1 Year-wise Research Productivity of JU

The Al Jouf University has published 801 papers during the span of 12 years from 2006-2017. A steep rise in the number of publications is observed from 2010 onwards. In the year 2006 the university published only 3 papers while in 2017 it published 209 papers, highest among all the years (Table 1). The papers published during last 5 years from 2013 to 2017 accounts for more than two-third of the papers published during 2006-2017. The data analyses revealed a steep rise in the number of publications in 2013 after which it gradually increases. The papers published by the university during 2006-17 received a total of 3631 citations with an average citation per paper (ACPP) of 4.53. The ACPP was the highest (6.28) in 2016, followed by 6.00 in 2014. Among 801 papers published during 2006-17, 57 research papers published in open access journals and the rest 744 in other journals.

Table 1:Year-wise Published Paper in JU

S. No.	Year	Total paper (%)	Average citation per paper	ICP (%)
1.	2006	3 (0.37)	0.00 (0)	2 (66.67)
2.	2007	5 (0.62)	0.09 (2)	3 (60)
3.	2008	8 (1.00)	0.87 (7)	4 (50)
4.	2009	16 (2.00)	2.19 (35)	9 (56.25)
5.	2010	27(3.37)	1.56 (42)	17 (62.96)
6.	2011	40 (4.99)	2.50 (100)	22 (55)
7.	2012	65(8.11)	3.08 (200)	31 (47.69)
8.	2013	96 (11.99)	4.16 (399)	53 (55.20)
9.	2014	89 (11.11)	6.00 (534)	56 (62.92)
10.	2015	117 (14.61)	4.95 (579)	96 (82.05)
11.	2016	126 (15.73)	6.28 (792)	112 (88.89)
12.	2017	209 (26.09)	4.50 (941)	186 (88.99)
Total		801 (100)	4.53 (3631)	591 (73.78)

4.2 National and International collaborations

The authors affiliated to JU have collaborated with authors of other institutions of Saudi Arabia as well as other

countries. The list of top 15 institutions collaborating with JU (having at least 20 collaborative papers) is shown in Table 2.

At the national level JU has the highest number of collaborative papers with King Abdulaziz University, Jeddah (48 papers) which is followed by King Saud University, Riyadh (41 papers) and Taif University, Taif (31 papers). Other major institutions collaborating with JU include Taibah University, Medina (15 papers) King Saud University College of Science, Riyadh (13 papers), and Umm Al Qura University (8 papers). It was observed that JU has published more papers in collaboration with authors of international institutions than national institutions.

At the international front, the university has the highest number of collaborative papers with Egypt (388 papers) and Malaysia (45 papers). Other major collaborative countries include United Kingdom (37 papers), India (33 papers), Pakistan (29 papers), Jordan (28 papers) and United States (22 papers). Out of a total of 801 papers, JU has collaborated with international institutions in 591 papers (73.78%). The highest number of international collaborations has been in the years 2017, 2016, and 2015 with 88.99 %, 88.89 % and 82.05 % papers respectively. The least percentage of collaboration was in 2012 (47.69%). The top international institute collaborating with JU is National Research Centre, Cairo (62 papers) which is followed by [Beni-Suef University](#), Beni Suef (50 papers), Suez Canal University, Ismalia (48 papers), and Mansoura University, Mansoura (43 papers).

The most collaborative authors of JU who have international collaborative papers are M. K. Alam (41 papers), M. A. Hamad (33 papers), A.A.M Farag and Samy A. Selim (27 papers each), Ahmed E. Abouelregal (25 papers) and B. M. Jarrar (20 papers). Twenty one international collaborative papers were published in the journal 'International Medical Journal' followed by 13 in 'Life Science Journal' and 12 each in 'Journal of Clinical and Diagnostic Research' and 'Renewable and Sustainable Energy Reviews'.

Table 2: Names of the top institutions collaborating with JU, 2006-2017

S. No.	Affiliation	Country	No. of papers
1.	National Research Centre, Cairo	Egypt	62
2.	Beni-Suef University , Beni Suef	Egypt	50
3.	King Abdulaziz University, Jeddah	KSA	48
4.	Suez Canal University, Ismalia	Egypt	48
5.	Mansoura University, Mansoura	Egypt	43
6.	King Saud University, Riyadh	KSA	41
7.	Ain Shams University, Cairo	Egypt	41
8.	Al-Azhar University , Cairo	Egypt	33
9.	Cairo University, Cairo	Egypt	32
10.	Universiti Sains Malaysia, Penang	Malaysia	31
11.	Taif University, Taif	KSA	31
12.	University of Tanta , Tanta	Egypt	28
13.	Assiut University , Assiut	Egypt	25
14.	Kafrelsheikh University	Egypt	25
15.	Fayoum University, Al-Fayoum	Egypt	23

4.3 Subject-wise Distribution of Papers

Scopus provides different subject categories to the articles based on its adopted classification method. The papers published by JU can be divided into different subject categories as shown in Table 3. A paper may appear in more than one subject category, so the total of different subject categories exceeds the actual number of papers. The highest publications appear in the subject category Medicine (160 papers). This indicates that the authors in medicine and allied disciplines are more productive in terms of research publications. The other main subject categories are Chemistry (81 papers), Physics and Astronomy (79 papers), Chemistry (140 papers), Biochemistry, Genetics and Molecular Biology (138 papers) and Engineering (131 papers). The ACP is the highest for Physics and Astronomy (7.94) followed by Computer Science (6.93), Material Science (5.68), Medicine (5.44) and Engineering (5.17).

Table 3: Major subject categories

Subject	No. of papers (% share of documents)	Average citation per paper
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Medicine	160 (19.98)	871 (5.44)
Chemistry	140 (17.48)	424 (3.03)
Biochemistry, Genetics and Molecular Biology	138 (17.23)	579 (4.19)
Engineering	131 (16.35)	677 (5.17)
Physics and Astronomy	129 (16.10)	1024 (7.94)
Materials Science	127 (15.85)	721 (5.68)
Pharmacology, Toxicology and Pharmaceutics	97 (12.11)	276 (2.34)
Mathematics	76 (9.49)	376 (4.95)
Agricultural and Biological Sciences	55(6.87)	174 (3.16)
Dentistry	54 (6.74)	115 (2.13)
Computer Science	42 (5.24)	291 (6.93)
Environmental Science	40 (4.99)	108 (2.70)
Others	128(15.98)	881 (6.88)

Note: One paper may fall under different subject categories, so the total exceeds the actual total number of papers

4.4 Preferred Common Journals for Communication

The authors of JU have published their research work in 160 different national and international journals. There are 17 journals in which only one paper is published by the authors of JU. There are 71 journals in which 2 papers each are published. Three papers have appeared in 30 journals and 4 papers in 20 journals.

The list of top 10 most preferred journals of JU having 8 or more publications is given in Table 4. These accounts for 14.48 % of the total publications which indicates that almost one-seventh of the total papers of JU are published in these 10 journals. The most preferred journal for publication by JU authors is International Medical Journal followed by Life Science Journal, Journal of Clinical and Diagnostic Research and Renewable and Sustainable Energy Reviews. The data analysis reveals that the authors of JU have been consistently publishing articles in the Journal of Clinical and Diagnostic Research since 2014 onwards. Similarly, in the 'Renewable and Sustainable Energy Review', authors of JU had been publishing their papers since 2012, but after 2015, the number of publications in this journal declined drastically. However, surprisingly in the journal 'International Medical Journal', all 21 articles by the authors of JU were published in just one single year 2017. Similarly, in 'Life Science Journal' out of 13 publications by the authors of JU, 10 papers came out in a single year 2013.

Journal citation reports provide a systematic, objective means to critically assess the world's leading journals, with quantifiable, statistical information based on citation data[18]. The impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years[19]. SCImago journal rank (SJR) is a prestige metric based on the idea that 'all citations are not created equal'. With SJR, the subject field, quality and reputation of the journal have a direct effect on the value of a citation based on the total number of citations in a subject field[20]. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa. It is defined as the ratio of a journal's citation count per paper and the citation potential in its subject field. As a field-normalised metric SNIP offers researchers, authors, and librarians the ability to benchmark and compare journals from different subject areas. This is especially helpful to researchers publishing in multidisciplinary fields.

Table 4 also shows the JCR impact factor (IF), SJR and SNIP values of the top 10 journals for the year 2016. Among these 10 journals the top 5 with highest IF are Renewable and Sustainable Energy Reviews (9.52), Bioorganic Chemistry (3.13), Journal of Superconductivity and Novel Magnetism (0.91), Journal of Clinical and Diagnostic Research (0.83), and Journal of Heterocyclic Chemistry (0.76). The top 5 journals according to SJR are Renewable and Sustainable Energy Reviews (3.051), Bioorganic Chemistry (0.828), Journal of Clinical and Diagnostic Research (0.343), Journal of Superconductivity and Novel Magnetism (0.340), and Journal of Heterocyclic Chemistry (0.298). According to SNIP values the top 5 journals are Renewable and Sustainable Energy Reviews (3.454), Bioorganic Chemistry (1.147), Journal of Clinical and Diagnostic Research (0.714), Life Science Journal (0.655), and Journal of Superconductivity and Novel Magnetism (0.546). Thus, it is observed that the IF, SJR and SNIP are the highest for the journal 'Renewable and Sustainable Energy Reviews'.

Table 4: Top 10 most productive journals of JU (2006-2017)

S. No.	Journal Name	Country	No. of papers	JCR IF (2016)	SJR (2016)	SNIP (2016)
1	International Medical Journal	Japan	21	0.18	0.128	0.163
2	Life Science Journal	China	13	0.689	0.135	0.655
3	Journal of Clinical and Diagnostic Research	India	12	0.83	0.343	0.714
4	Renewable and Sustainable Energy Reviews	Netherlands	12	9.52	3.051	3.454
5	Journal of Hard Tissue Biology	Japan	11	0.34	0.188	0.231
6	Journal of Superconductivity and Novel Magnetism	United States	11	0.91	0.340	0.546
7	Journal of Heterocyclic Chemistry	United States	10	0.76	0.298	0.380
8	Journal of Pure and Applied Microbiology	India	10	0.17	0.135	0.158
9	Bioorganic Chemistry	Netherlands	8	3.13	0.828	1.147
10	Der Pharma Chemica	Pakistan	8	0.58	0.188	0.458

Total papers in top 10 journals	116
Total papers of JU	801
Share of top 10 journals in JU output (in %)	14.48%

JCR IF= JCR impact factor, SJR= Scimago journal rank, SNIP= Source normalized impact per paper

4.5 Highly Prolific Authors

The authors having 10 or more publications during 2006-2017 are shown in Table 5 along with their number of papers, ACP and *h*-index. The research activity seems to be highly skewed as the top 15 authors account for more than one-third (36.45 %) of the total publications of JU. The average productivity of these 15 authors was 19.5. 6 authors have scored higher research productivity than this average productivity.

Table 5: Most productive authors of JU from 2006-2017

S.No.	Author	Subject	No. of Papers	Citations Recieved	ACPP	<i>h</i> -index
1.	Alam, M.K.	Dentistry	41	02	0.049	13
2.	Hamad, M.A.	Physics	33	636	19.27	21
3.	Farag, A.A.M.	Physics	27	40	1.48	35
4.	Selim, Samy A.	Biochemistry, Genetics and Molecular Biology	27	60	2.22	7
5.	Abouelregal, Ahmed E.	Mathematics	25	161	6.44	13
6.	Jarrar, B.M.	Mathematics	20	249	12.45	9
7.	Germoush, Mousa O.A.	Biology	18	128	7.11	6
8.	Aly, Ashraf A.	Chemistry	15	58	3.87	18
9.	Mohamed, Ashraf M.	Chemistry	14	94	6.71	10
10.	Khaled Al-Omiri, Mahmoud	Dentistry	13	69	5.31	15

11.	Abdelgawad, Mohamed A.	Pharmacy	12	24	2.00	7
12.	El-Ghonemy, A. M.K.	Engineering	12	81	6.75	5
13.	El-Khateeb, M. A.	Environmental Sciences	12	36	3.00	9
14.	Salem, Ahmed	Mathematics	12	89	7.42	8
15.	Hassan, Sherif H.M.	Medical Sciences	11	26	2.36	5

total output of top 15 authors **292***

total publications of JU **801**

share of top 15 authors in university output (%) **36.45 %**

**Total is less as these 15 authors have collaborations among themselves also*

Among these top 15 authors, 3 are from Mathematics, 2 each are from Dentistry, Physics and Chemistry and 1 each are from Biochemistry, Pharmacy, Engineering, Biology, Environmental Sciences and Medical Sciences. M. K. Alam, College of Dentistry is the most productive author of JU in terms of publications with 41 publications, but surprisingly all his research papers were published in a single year 2017 and that's why received a very nominal citation average (0.049). The *h*-index, suggested by Jorge E. Hirsch in 2005, takes into account both the quantity and 'quality' (or impact) of publications and helps to identify distinguished scientists who publish a considerable number of highly cited papers. A scientist has index *h* if *h* of his or her no. of papers have at least *h* citations each, and the other ($N_p - h$) papers have $\leq h$ citations each¹³. The authors from Department of Physics, College of Science, M. A. Hamad and A. A. M. Farag have the highest ACCP of 19.27 and *h*-Index 35 respectively.

Table 6: Citation profile of papers of JU (2006-2017)

No. of Citations	No. of Papers
Zero Citations	307
1-5	324
6-10	73
11-15	36
16-20	15
21-25	16
26-30	10
31-35	07
36-40	1
41-45	1
46-50	2
>50	6
total citations received	3631

4.6 Citation Profile and Highly Cited Papers

The distribution of citation data of JU is shown in Table 6. It shows that 307 (38.33 %) papers did not receive any citation. The remaining 61.67 % papers received at least one or more citations. 6 papers received more than 50 citations. Table 7 gives the list of top 18 highly cited papers receiving 30 or more citations. These 18 papers have appeared in 16 different journals.

Table 7: Highly cited authors

S. No.	Authors	Journal	No. of Citations
1	Al-Sharari H.D.	<i>WSEAS Transactions on Communications</i> , 2007, 6 (10), 811-814	229
2	Jarrar B.M., AL-Rowaily M.A.	<i>Journal of Venomous Animals and Toxins Including Tropical Diseases</i> , 2008, 14(3), 514-526	130
3	Meshref, A. A R	<i>Pakistan Journal of Nutrition</i> , 2008, 7(1), 118-125	87
4	Al-Sharari H.D.	<i>WSEAS Transactions on Communications</i> , 2008, 3 (4), 252-258	66
5	Abdel-Aziz S.S.	<i>Journal of Physics: Conference Series</i> , 2008, 111(1),	62
6	Jarrar B.M., Al-Rowaily M.A.	<i>Annals of Saudi Medicine</i> , 2008, 28(3), 183-187	52
7	Abdel-Aziz S.S.	<i>Journal of Physics: Conference Series</i> , 2008, 111(1)	46
8	Melgani F., Bazi Y.	<i>IEEE Transactions on Information Technology in Biomedicine</i> , 2008, 12(5), 667-677	46
9	Samaha H., Al-Rowaily M., Khoudair R.M., Ashour H.M.	<i>Emerging Infectious Diseases</i> , 2008, 14(12), 1916-1918	44
10	Al-Dmoor H.M., Saqer H., Al-Lruwaili M.	<i>Journal of Food, Agriculture and Environment</i> , 2009, 7(2), 155-158	36
11	Samaha H., Mohamed T.R., Khoudair R.M., Ashour H.M.	<i>Immunobiology</i> , 2009, 214(3), 223-226	35
12	Sultan K.S., Ismail M.A., Al-Moisheer A.S.	<i>International Journal of Computer Mathematics</i> , 2009, 86(4), 693-702	33
13	Mourou M.A.	<i>Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)</i> , 2009, 5, 071	33
14	Shakhreet B.Z., Bauk S., Tajuddin A.A., Shukri A.	<i>Radiation Protection Dosimetry</i> , 2009, 135(1), 47-53	32
15	Mebed A.M., Abd-Elrahman M.I., Abd-Elnaiem A.M., Gaffar M.A.	<i>Phase Transitions</i> , 2009, 82(8), 587-598	32
16	Al-Mansour M.I., Al-Otaibi N.M., Alarifi S.S., Ibrahim S.A., Jarrar B.M.	<i>Toxicological and Environmental Chemistry</i> , 2009, 91(6), 1191-1203	31
17	El-Hussein K.	<i>International Journal of Mathematical Analysis</i> , 2009, 3 (9-12), 419-429	31
18	Etman M.A., Bedewy M.K., Khalil H.A., Azzam B.S., Ali S.H.R.	<i>International Journal of Nanoparticles</i> , 2009, 2(1-6), 339-353	30

5. CONCLUSIONS

This study has explored the publishing behavior of scholars of Al-Jouf University. The twelve years (2006-17) study examined a total of 801 papers that appeared in the form of journal articles, reviews and articles in press. The study indicates that the highest numbers of papers (209) were published in the year 2017 and the lowest (03) in 2006. A steep rise in the research publications of JU was observed during the year 2013 and 2017. The increasing research productivity of the university can be attributed, to some extent, to the increase in major and minor research projects being undertaken by the faculty members during the last few years. The average citation per paper (ACPP) of JU papers was 4.53 and this was lodged highest (6.28) in 2016. King Abdulaziz University, Jeddah was main collaborator with 48 papers followed by King Saud University, Riyadh (41 papers). Among the international collaborations, two institutes of Egypt were in lead –National Research Centre, Cairo (62 papers) and Beni-Suef University (50 papers). Medicine (160) and Chemistry (140) have been the front runner as research subjects of which the largest numbers of articles were published in different journals. Among the productive authors, M. K. Alam of College of Dentistry comes in front with the highest number of publications. M. A. Hamad of Department of Physics, College of Science was having largest citations per paper in terms of its average number. The paper by H. D. Al-Sharari had the highest number of citations which cumulated into 229 in number. Out of 801 papers, only 6 papers carried 50 or more citations. The uniform citation pattern was not observed in the results of the study.

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